

door spiders, pocket-gophers, robber-crabs, squirrels, ants, tree-frogs, weaver birds, scarab beetles, and many others come in turn upon the stage. From the nature of the case, a book that covers so wide a range must be in the main a compilation. But the authors add a good many observations of their own. Moreover—a very great merit this—they investigate the current animal stories before accepting them as true. There is none of the *credo quia mirabile spirit*. They tell us, for instance, that the mole's "fortress" is not the highly elaborated structure which a succession of books on natural history have each in turn still further beautified and complicated, but something much more varying and irregular. Altogether it is a very interesting book. The illustrations, not very numerous, are good.

(5) "Our School Out of Doors" is a book of a very different type. It contains a great deal of correct information on interesting subjects, but it is too miscellaneous, and it suffers from the plan on which it is arranged. Intended for the use of school teachers, it has one or more chapters for each month. This shifting from one subject to another, each very briefly and imperfectly explained, cannot be good for pupil or teacher. In May, Composite flowers are, apparently, to be studied before the pupil has any knowledge of the structure of a common buttercup. In August, five pages are devoted to "watery wonders." It would be far better to study some of the subjects more thoroughly and to neglect others altogether.

#### OUR BOOK SHELF.

*Hints to Travellers, Scientific and General.* Edited for the Council of the Royal Geographical Society by E. A. Reeves. Ninth edition, revised and enlarged. Two vols. Vol. i., pp. xi+470; vol. ii., pp. v+286. (London: Royal Geographical Society, 1906.) Price 15s. net.

In editing this ninth edition of the well-known "Hints," Mr. Reeves has taken a point of view somewhat different from that of his predecessor, Mr. John Coles, in the earlier editions. He says:—"As the days of the pioneer explorer of the old type are fast drawing to a close . . . more exact surveys are required than were formerly considered sufficiently accurate for the traveller in unexplored regions." Hence, in the first and larger volume, which is, as before, wholly devoted to surveying and mapping, some of the approximate methods, and the tables connected with them, have been omitted, and a higher standard of accuracy is aimed at throughout. While it seems possible that the effect may be to discourage some travellers who could still do quite useful surveying work from attempting anything at all, and in others to transform a journey in an unexplored region into a surveying expedition pure and simple, it remains unquestionable that Mr. Reeves has produced a condensed treatise on surveying of a high order of excellence.

In the section on instruments, the chief new features are the descriptions of the applications of Mr. Reeves's devices, the "tangent-micrometer" and "endless tangent screw," to the theodolite and sextant. It may be noted that the illustrations of the transit theodolite on pp. 29 and 40 are distinctly inferior to those in the older editions, and are scarcely

sufficiently clear for their purpose. Part iv. of this volume, on geographical surveying and mapping, has been practically re-written; the main heads dealt with are:—(a) the determination of fixed points, which includes triangulation with the transit theodolite, latitude and azimuth traverses with normals of angles from stations on the route, and latitudes and longitudes; (b) the filling in of detail and route surveying; and (c) the determination of heights. The first of these sections contains much new and useful matter relating to interpolation, reduction to centre, and geodetic computations. The fifth division, on astronomical observations, has also been to a great extent re-written; the methods of determining longitude by means of lunars, moon-culminating stars, and the eclipses of Jupiter's satellites are omitted, and the space devoted to more complete descriptions of the observations for latitude, time, and azimuth, great additional clearness being gained in the computations by the free use of diagrams and formulæ. The only absolute method of determining longitude described is that of occultations.

In the second volume the chief new feature is an extremely valuable section on archæology, by Mr. D. G. Hogarth, which gives general hints on methods of recording, cleaning, temporarily conserving, and conveying monuments and objects of antiquity.

*Sechs Vorträge über das thermodynamische Potential, &c.* By J. J. van Laar. Pp. viii+119. (Brunswick: Vieweg und Sohn, 1906.) Price 3.50 marks.

THIS pamphlet of close upon 120 pages really contains eight lectures, the first and second being, as stated in the expanded title, on non-dilute solutions and osmotic pressure respectively. These two introductory lectures are polemical, and attack in a lively manner the position assumed explicitly by some, implicitly by many, that the so-called osmotic pressure is a real pressure due to the molecules of the solute. The author pokes fun at the "dilute school" for pinning their faith to the first term of a diverging series, and for leaving out of account in all their theorising that most essential thing in osmosis, the semi-permeable membrane. He shows that instead of the "osmotic pressure" depending on the solute, it depends fundamentally on the solvent, being mathematically expressible to a first approximation in terms of the difference of the molecular potentials of the two solutions separated by the membrane. He makes an appeal in favour of the use of the thermodynamic potential, which is applicable to all cases, including those of weak solutions, for which alone the method of the osmotic pressure is of any real service. According to his facetious comparison, to explain the accompanying phenomena by an appeal to osmotic pressure is as if one explained an angry man's hasty speech as due to his red face. The anger is the cause of both; and in like manner the thermodynamic potential forms the basis of the true theory. Then follow the six lectures on the thermodynamic potential and its applications to the problems of chemical equilibrium.

Lecture i. begins with entropy, deduces the usual thermodynamic relations, and finishes with the general conditions for equilibrium. The next lecture contains some simple illustrations leading to the recognition of particular cases of Gibbs's phase rule. This important rule is proved in lecture iii., and more complex cases are considered of mixtures of solids, liquids, and vapours. The fourth lecture discusses the thermodynamic properties of mixtures of ideal gases, deduces Gibbs's dissociation formula, and applies it to certain simple cases. The effects of

temperature and pressure changes are also considered and the usual formulæ deduced. Then follows, in lecture v., the investigation to a first approximation of mixtures of two fluids, leading to the discussion of fusion and solubility curves. Finally, in lecture vi., vaporisation curves and the theory of the galvanic cell fall to be considered. The same fundamental method is used throughout, the thermodynamic potential being first formulated, and then by differentiation the quantity known as the molecular potential. Detailed examples elucidate the method; and there is no doubt that (to paraphrase his own words) the author has demonstrated, not only the great use of the thermodynamic potential, but also the ease with which it can be manipulated. Dr. van Laar has placed in the hands of the student of thermodynamics a well-written and serviceable pamphlet.

*The Family.* By Helen Bosanquet. Pp. vii + 344. (London: Macmillan and Co., Ltd., 1906.) Price 8s. 6d. net.

THE "Family" is a subject of far greater extent than most persons may think. Its importance to society is enormous, though, like the air we breathe, it attracts little attention. The variety in the constitution of family life in different places and at different times is extraordinary. Its peculiarity in any given case is the result of many influences, including long-standing tradition, economic causes, natural instincts, and legislation on succession of property. The author has given a valuable *résumé* of facts and opinions derived from more than thirty writers of note, and she has blended them into a pleasant and readable volume which will open out new and wide vistas of interest to most of those who study it. She says that the history of the Family "is a great work waiting for a great scholar." It is no disparagement to this book to add that she speaks truly; only it seems to the writer of this notice that a still more important requisite than scholarship is a more enlightened statistical treatment of the subject than it has for the most part yet received.

One of the many of these desiderata is an exact analysis of the effects of different forms of the Family on the eventual well-being of the race. These have a strong influence on the marriages or on the celibacy of its members. The influence of the Family inclusive of religion, in France, is such that in the year 1900, as stated, no less than sixty-four thousand women were immured for life within convent walls. Some forms of family life may be found to exert a considerable eugenic effect on the nation, others the contrary; how far has yet to be investigated. In the view of the author the power of the Family is not decaying in England. She thinks it has developed in a changed direction, through replacing a slavish submission to the head of the family by feelings of willing loyalty. The proved habit of the artisan class to contribute to the well-being of the Family is to her an evidence of the strength of the bonds that still unite its members. In conclusion, it should be said that this volume contains occasional passages of rare eloquence, such as those in p. 160 and onwards, on the very real and spiritual entity of the Family. F. G.

*The Evolution of Man: a Popular Scientific Study.* By Ernst Haeckel. Translated from the fifth (enlarged) edition by Joseph McCabe. Two vols. in one. Pp. xiv + 364. (London: Watts and Co., 1906.) Price 2s. net.

A TRANSLATION of the fifth edition of Haeckel's famous book is now procurable for two shillings! It is true that the text has been somewhat condensed, and that the beautiful plates of the complete edition have had

to be omitted, but the gist of the matter is here, and is illustrated by more than four hundred figures. Moreover, a library edition of the complete work is also available to English readers. As is well known, the first half of the book contains a general account of the development of vertebrates, and of man in particular, while the second half discusses the chief phyletic stages from protists to man, and the gradually increasing differentiation of the various organs and systems. There is a great deal of embryology and comparative anatomy in the book, but there is very little *aetiology*, and the English title "The Evolution of Man" is rather misleading. The original title was "Anthropogenie." Many parts of the book, e.g. those dealing with the development of the foetal membranes and of the excretory system, are very technical and difficult; serious students of biology will find these intricate subjects more clearly discussed elsewhere, and we do not think that other readers will understand them. The translation bristles with mistakes, some of which show that even the translator has not always understood his text. The kind of mistake we allude to is translating "Rest der Chorda" as "rest of the chorda," and "Zungenbogen" as "hyaloid bone."

*Untravelled England.* By James John Hissey. Pp. xviii + 459. (London: Macmillan and Co., Ltd., 1906.) Price 16s.

THE author describes how he set forth in search of unfrequented spots in his own country, and goes on to provide a pleasing and quietly entertaining account of the out-of-the-way places he visited. The start from Eastbourne in a motor car does not, it must be confessed, encourage the reader to expect much in the way of romance; but the motor car, because of its persistently satisfactory conduct, does not obtrude itself into the narrative. There is no attempt at "fine" writing, yet the author succeeds in maintaining the reader's interest in the English and Welsh villages passed through, and in conveying a pleasing impression of the characters of the natives encountered. The volume is illustrated by twenty-four half-tone reproductions from photographs taken by Mr. Hissey on the journey.

#### LETTERS TO THE EDITOR.

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#### A Japanese Singing Kettle.

THE town of Morioka is well known for the manufacture of the iron kettle which is indispensable in every Japanese household. There exist numerous forms of kettle; several dozen shapes may be counted in a single shop, but the most frequently occurring forms are cylindrical, pear-shaped, and spherical. The kettle is used for boiling water by means of charcoal fire for making tea. On approaching boiling point, some of these kettles begin to sing with quavering sound, which is a combination of different notes, peculiar to the form and size of the kettle.

There are several arrangements for producing sound, of which the following will indicate the manner in which the vibrations are produced. Inside the kettle, the bottom is nearly flat. On this four pieces of sheet iron, 15 mm. sq. and 0.4 mm. thick, are glued by means of Japan lac (*urushi*), which can well withstand the temperature of boiling water. Between the bottom and the plates is an air space nearly  $\frac{1}{2}$  mm. thick. The plates are nearly in a plane, and almost touch each other, leaving thin slits between them. When the kettle is full the cell is under the water, and some air remains in the cell between the